

Patent Application of
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(resident of Toronto, Ontario, Canada)
for
IMPROVED DOOR-LOCKING DEVICE

BACKGROUND OF THE INVENTION

Field of Invention

Lou F. Del Nin, in his U.S. Patent No. 5,983,680 issued November 16, 1999 and entitled "Door Locking Device", provided a unique security device comprising both horizontal and vertical deadbolts and significantly advancing the art of door-mounted security devices. The disclosures provided equipment and methods for engaging both horizontal and vertical deadbolts that could be engaged either simultaneously or independent of each other, and allowing one to even open the door with the vertical deadbolt still engaged. These disclosures merit a careful understanding and are incorporated by reference.

Description of Prior Art

Many devices are known to prevent forced entry through a partially open door, including door-mounted chain locks and floor-mounted doorstops which secure a completely closed door, or alternatively allowing such door to be opened a small amount while keeping it secured against forced entry.

The security locking device described by Del Nin's patent is unique in that it provides protection against forced entry both when the door is closed and also when the door is open by way of vertical bolt remaining mounted to the door, regardless of whether engaged or disengaged. An additional safety feature unique to Del Nin's U.S.-patented door-locking device is that potential intruders are prevented from removing the vertical bolt from a floor-plate aperture with the door remaining in partially-open position.

However, Del Nin's U.S.-patented device itself suffers three underlying deficiencies. First of all, key components of Del Nin's device are situated outside of its protective lock-box casing, and therefore vulnerable to physical attack by an intruder. Referring to reference numbers contained in Del-Nin's U.S. patent, vertical movement of knob 86 up and down C-shaped opening 88 takes place inside sleeve 84 rather than inside lock-box 30 whose casing offers greater protection in that it is significantly less exposed to attack because of its location higher up on the door and therefore farther from reach of attack by any potential intruder. As a result of its location situated outside lock-box 30 of that patent, isolated from its casing other supporting parts with which to share direct brunt of a potential intruder's attack, and its more easily accessible location situated lower down on the door within reach of easy attack by potential intruder, positioning of knob 86 of that patent within sleeve 84 of that patent provides easier access to potential intruders capable of reaching around the door towards gaining entry through destruction of this weakest link in Del Nin's original U.S.-patented door-locking device.

Secondly, the door locking device described by Del Nin's U.S. patent is disadvantaged from fact that a door opening from the left side necessarily requires a door-locking device containing locking mechanism specifically designed for left-side opening doors, and vice versa. Therefore, manufacturers of such door-locking device would be required to produce and attach different locking mechanisms with different gearing arrangements depending on whether the door-locking device in question is being suited to a door opening from either the left or right side of a door frame. Similar difficulties ensue for both vendors of such device required to stock both left-sided and right-sided door-locking devices under separate label and inventory, along with

additional cost and inconvenience faced by end-users of Del Nin's door-locking device who may be unable to re-install such door-locking device from previous residence to new residence where such newer residence employs a door hinged from opposite side of the door-frame.

Thirdly, Del Nin's U.S.-patented door-locking device is disadvantaged due to its reliance on a spring mechanism 79 of that patent for engaging and disengaging its vertical deadbolt 34 from open to closed position, and vice versa. Such a spring mechanism described by Del Nin's U.S. patent requires a larger, more expensive, and more unsightly lock box for use on such door locking device. Such spring mechanism also wears out over time, eventually interfering with smooth operation of the door locking device itself, and until such time that it is replaced at significant expense and inconvenience to the end-user. Finally, incorporation of such spring mechanism 79 allows an intruder to actually disengage vertical deadbolt 34 on their own by potentially reaching around a partially-opened door and manually pulling the vertical deadbolt out from the floor-plate's aperture upwards into inherent slack of spring mechanism 79.

Objects and Advantages

The present improvement addresses disadvantages of Del Nin's U.S.-patented device in a novel manner by providing a stronger, more secure, more compact, single ambidextrous locking-device that can be installed on all doors regardless of whether they are hinged from left or right sides of the door frame.

The security lock of the present improvement comprises an elongated bolt secured to a door and which is slidable in a direction parallel to one of its faces. The elongate bolt is extendable into at least one engaged position in which an end portion of the bolt extends into an aperture adjacent to the door, and similar to the deadbolt described by Del Nin's U.S. patent. Also like the deadbolt described by Del Nin's U.S. patent, complete removal of the bolt from this aperture allows the door to be opened completely.

However, unlike the deadbolt described by Del Nin's U.S. patent, this improved version comprises a bayonette latch mechanism attached directly onto vertical deadbolt **34**, preferably mounted onto rivet **80** of that patent. A smaller square-shaped bolthead is mounted onto face of what is now a smaller gear replacement for second gear **78** of that patent, which bolthead slides horizontally within aperture of the bayonette latch mechanism when the smaller gear upon which it is mounted gets turned by a first larger gear, which first larger gear is turned by the user's key.

The v-shaped spring-mechanism is replaced.

As a result of this improvement, the deadbolt described by Del Nin's U.S. patent need no longer incorporate any form of v-shaped or even any spring mechanism whatsoever. Accordingly, the door locking mechanism benefits from significantly improved durability and reliability due to its improved reliance on gears rather than spring mechanisms prone to deterioration over time and use. Also addressed is shortcoming of the spring's inherent slack that would actually allow an intruder means of manually lifting vertical deadbolt **34** out from its floor-plate aperture, no longer problematic following replacement of spring mechanism **79** with inflexible bayonette latch in this improved version.

Lock-box casing can be reduced in size.

As a further result of this improvement, lock-box casing can be diminished in size due to replacement of Del Nin's v-shaped spring mechanism with more compact second gear, bayonette latch mechanism, and square bolthead sliding horizontally within aperture of this bayonette latch mechanism. In its preferred version, this improvement additionally reduces size, cost, and unnecessary bulk of first gear **76** of Del Nin's U.S. patent by squaring off two adjoining outside surfaces of this first gear. Such smaller squared-off first gear is now feasible because such first gear no longer requires 360 degree movement due to greatly reduced rotation on smaller second gear now limited by affixed square bolthead whose travel is in turn confined by bayonette latch mechanism's limited horizontal aperture.

First of all, as a result of this improved configuration and smaller lock-box required, Del Nin's U.S.-patented door locking mechanism can now be manufactured more compactly which benefits users by more attractive door locking mechanism for their doors, and reduced cost due to fewer and smaller parts employed under the improved device. Secondly, this improvement further adds security in that a smaller lock-box casing is more easily and solidly attached to doors featuring indented moulding and other non-flat surfaces to which less than full surface-area of Del Nin's larger door-locking mechanism could meet flat against the door. Thirdly, manufacturing costs are reduced in that less material overall is required for manufacture of such improved door-locking mechanism. Finally, reversible design of improved bayonette latch mechanism means that upper lock-box portion of the door-locking device described by Del Nin's U.S. patent is rendered horizontally reverseable so as to accommodate both left and right hinged doors alike.

Fewer parts are now necessary.

In addition to such improvement relating to gearing of Del Nin's door-locking device, preferred aspect of this improvement additionally does away with connecting rod **82** of that patent no longer necessary to connect v-shaped spring mechanism **79** no longer present in this improved version. Fewer parts employed in this improved door-locking device provides benefits of lower manufacturing costs, reduced vulnerability to intruder attack with weaker components connecting rod **82** and spring mechanism **79** of Del Nin's U.S. patent no longer employed, and overall ability to accommodate fewer number of parts into more compact lock-box casing less costly to manufacture, easier to mount flush onto moulded doors, and overall more attractive to end-users of the improved door-locking device.

BRIEF SUMMARY OF THE INVENTION

In accordance with the present invention, an improved security device comprises a latch mounted onto a larger gear meshing with a smaller gear on which is mounted a square bolthead travelling horizontally through a bayonette latch, in turn attached to a vertical deadbolt, which in turn features a knob travelling vertically through C-shaped aperture carved out of tubular portion of said bayonette latch thereby engaging or disengaging said vertical deadbolt either simultaneously with or independent of a horizontal deadbolt, which horizontal deadbolt is in turn either engaged or disengaged by said latch mounted on said first gear.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Drawing Figures

In order that this improved door-locking device may be readily understood, preferred embodiments of the invention will be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a preferred security lock of the present improved invention installed on a door;

FIG. 2 is a cut-away isolated view showing components of the lock-box's internal mechanism and related components of the improved door-locking device shown in FIG. 1.

Reference Numerals in Drawings

4	door	6	inner face of door
8	hinges of door	10	door opening
12	floor	14	doorknob
16	horizontal deadbolt	18	vertical edge
20	security lock	22	lock-box mechanism
24	hand-operated latch	26	vertical deadbolt
28	floor-plate	30	aperture in floor-plate
32	saddle bracket	34	sleeve for vertical deadbolt
36	larger squared-off gear	38	smaller gear
40	knob mounted on smaller gear	42	square bolthead
44	bayonette latch	46	horizontal aperture
48	knob mounted on vertical deadbolt	50	c-shaped aperture
52	top position of c-shaped aperture	54	bottom position of c-shaped aperture
56	bottom edge of door		

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a door 4 having an inner face 6 and an outer face (not shown) and being pivotably mounted on hinges 8 in a door opening 10 above a floor 12. Although door 4 is shown in FIG. 1 as being in a closed position, it is to be appreciated that door 4 is pivotable in door opening 10 in a conventional manner to adopt both open and closed positions.

Door 4 is equipped with a doorknob 14 which operates a conventional lock set (not shown), as well as a conventional horizontal deadbolt 16 extending through the inside of door 4 and into an aperture (not shown) in a vertical edge 18 of the door opening 10.

Also shown in FIG. 1 is a preferred security lock **20** according to the present improved invention. Security lock **20** comprises a lock mechanism **22** attached to the inner face **6** of door **4**, a vertical deadbolt **26** extending vertically downwardly from lock mechanism **22**, and a plate **28** attached to floor **12** and covering an aperture **30** in floor **12** into which vertical deadbolt **26** extends. Hand-operated latch **24**, also shown in FIG. 2 in dotted lines, turns first gear **36** of FIG. 2 and also extends and retracts horizontal deadbolt **16** in a conventional manner.

The vertical deadbolt **26** is preferably made from a metal such as brass or steel, with a diameter of from about 3/8 to about 3/4 inches, more preferably about 1/2 inch. Vertical deadbolt **26** has a preferred length of from about 30 to about 48 inches when used on a conventional sized door, and is typically from about 40 to about 42 inches long.

The vertical deadbolt **26** is secured to door **4** by at least one saddle bracket **32**, and preferably two or more saddle brackets **32** as shown in FIG. 1. The brackets **32** are secured to the inner face **6** of door **4** and permit vertical sliding motion of vertical deadbolt **26** parallel to inner face **6** of door **4**.

FIG. 2 illustrates improved lock mechanism **22** in isolation from the door **4** on which it is installed, and having its front cover cut away to reveal its internal parts. Lock mechanism **22** provides a means by which both the horizontal deadbolt **16** and vertical deadbolt **26** may be simultaneously engaged and disengaged. As shown in FIG. 2, lock mechanism **22** encloses two gears, a first gear **36** squared-off on two adjoining sides and connected to horizontal deadbolt **16**, and a second smaller gear **38** on which square bolthead **42** sits atop knob **40** mounted on smaller gear **38**. The square bolthead **42** slides within horizontal aperture **46** of bayonette latch **44**, which bayonette latch **44** connects to vertical deadbolt **26** of improved security lock **20**.

Hand-operated latch **24**, shown in FIG. 2 in dotted lines, turns first gear **36** and also extends and retracts horizontal deadbolt **16** in a conventional manner. It is to be appreciated that

hand-operated latch **24** may preferably be replaced by a key-operated latch (not shown), and that the outer face of door **4** is preferably provided with a key-operated latch mechanism (not shown) which turns first gear **36**.

As shown in FIG. 2, first squared-off gear **36** and second smaller gear **38** mesh with one another such that rotation of first squared-off gear **36** rotates second smaller gear **38** in the opposite direction. This permits horizontal deadbolt **16** and vertical deadbolt **26** to be operated simultaneously by turning first squared-off gear **36**.

As shown in FIG. 2, square bolthead **42** is mounted off-centre to the smooth side surface of second smaller gear **38**, allowing such square bolthead **42** to travel left and right along horizontal aperture **46** of bayonette latch **44**. The larger tubular-shaped end of bayonette latch **44** in turn forms a sleeve both wrapping around and attached to vertical deadbolt **26**, and in such manner that entire bayonette latch **44** travels up and down in conjunction with vertical deadbolt **26**, and within confines of sleeve **34** which sleeve surrounds upper portion of vertical deadbolt **26** for added stability.

Operation

As hand-operated latch **24** or any other form of key latch is turned in the lock mechanism, first squared-off gear **36** turns second smaller gear **38**, causing square bolthead **42** to travel along horizontal aperture **46**, placing vertical pressure through square bolthead **42** onto bayonette latch **44** so as to move entire bayonette latch **44** up or down to raise and lower vertical deadbolt **26** in and out from what is shown in FIG. 1 as aperture **30** of floor-plate **28** installed into surface of the floor.

With horizontal deadbolt **16** engaged (in the locked position) as shown in FIG. 1, vertical deadbolt **26** may either be in the first or second engaged position, thereby providing a second lock to prevent forced entry through door **4**. When horizontal deadbolt **16** is disengaged

(unlocked), vertical deadbolt **26** may either be in the first engaged position or in the disengaged position. Therefore, with horizontal deadbolt **16** unlocked, door **4** may either be opened partially, with vertical deadbolt **26** in the engaged position, or door **4** may be opened completely with vertical deadbolt **26** completely disengaged.

Therefore, vertical deadbolt **26** is capable of adopting two positions for each position of the horizontal deadbolt **16**, and security lock **20** is preferably provided with a separate mechanism by which the desired position of vertical deadbolt **26** may be selected.

As shown in FIG. 2, the tubular-shaped end of bayonette latch **44** forms a hollow-sleeve around the upper end of vertical deadbolt **26**. This hollow-sleeve portion of bayonette latch **44** preferably contains a C-shaped aperture **50** through which knob **48** which may preferably be threaded into or otherwise attached to vertical deadbolt **26** after the upper end of vertical deadbolt **26** is inserted into such hollow-sleeve portion of bayonette latch **44**.

When knob **48** on vertical deadbolt **26** is received in the upper arm **52** of C-shaped aperture **50**, as shown in FIG. 2, the lower-end of vertical deadbolt **26** has two possible positions, either engaged or disengaged, depending on the position of horizontal deadbolt **16**. Preferably, knob **48** would be received in upper arm **52** of C-shaped aperture **50** when it is desired to deactivate the door-stop feature of security lock **20**, so that when horizontal deadbolt **16** is unlocked, door **4** may be completely opened.

When knob **48** is moved through C-shaped aperture **50** to become received in lower arm **54**, vertical deadbolt **26** is in either the first or second engaged position, depending on the position of horizontal deadbolt **16**. Preferably, knob **48** is received in lower arm **54** of C-shaped aperture **50** when it is desired to use the door-stop feature of security lock **20**. Specifically, with horizontal deadbolt **16** unlocked, vertical deadbolt **26** is in the first engaged position, so that door **4** may be partially opened within limits allowed by aperture **30** in floor-plate **28**.

Conclusion, Ramifications, and Scope

Although this improved security lock according to the present invention has been described herein as being applied to a door, it is to be appreciated that this improved security lock design may preferably be used with other hinged structures, such as windows and gates. For example, this improved security lock may be provided in an inwardly opening casement window, with the improved bolt and lock mechanism being provided in or on the window sash and the floor-plate being provided in the window sill.

Although this improved security lock has been described as having a vertical deadbolt, it is to be appreciated that a security lock may be provided where, for example, the deadbolt extends horizontally into a slotted opening in the side jamb of a door opening. Furthermore, a security lock may be provided in which the deadbolt extends upwardly into a slotted opening above the door, for example, in the ceiling.

Although this improved security lock has been described as being applied to a door having a conventional horizontal deadbolt, it is to be appreciated that this is not necessary. The security lock of the present improved invention may instead be used on its own or in combination with any other type of door lock.

Although this improved security lock has been described in connection with certain preferred embodiments, it is not intended to be limited thereto. Rather it is intended that this invention cover all alternate embodiments as may be within scope of the following claims. This invention also includes all embodiments which are functional equivalents of the specific embodiments and features which have been described herein.

It will be further understood that, although various features of this invention have been described with respect to one or another of the embodiments of the invention, the various features and embodiments of the invention may be combined or used in conjunction with other features and embodiments of the invention as described herein.